REMR Material Data Sheet CM-PC-1.19

Concrete Patching Material: Wear Resistant Putty WR-2

1. NAME

Devcon Wear Resistant Putty WR-2

2. MANUFACTURER

Devcon Corporation
30 Endicott Street
Danvers, MA 01923
Phone: 508-777-1100

3. DESCRIPTION

Devcon Wear Resistant Putty WR-2 is a two-component epoxy system consisting of a putty resin filled with fine graded ceramic and a heavy cream hardener. Sand may be used to extend the system.

4. USES & LIMITATIONS

Uses: WR-2 is typically used to protect surfaces that interface with abrasives. Some recommended uses are as protection for parts that interface with surfaces and for rebuilding metal wear surfaces to exacting dimensions. Typical metal uses include rebuilding pumps, shafts, valve seats, wear liners, and cyclones. Typical concrete-repair uses include stilling basins, tunnels, and other hydraulic structures to help resist abrasion and/or cavitation.

Limitations: Epoxy is temperature sensitive. At high temperatures, above 75°F, epoxy will cure more quickly. Plan on a shorter working time when epoxy is mixed in large quantities in warm weather. Epoxy can be mixed in small masses to prevent the material from curing too rapidly. At low temperatures, epoxy will not cure properly. Below 60°F the epoxy and/or repair area should be heated to room temperature. To promote curing of epoxy at low temperatures, warm the repair area and epoxy with heat lamps. Place heat lamps about 18 in. from the epoxy repair. Never expose epoxy to a direct flame.

5. MANUFACTURER'S TECHNICAL DATA

Property	Test Method	Value
Cure hardness, Shore D	ASTM D 2240	85
Compressive strength	ASTM D 695	9,800 psi
Flexural strength	ASTM D 790	6,500 psi
Adhesive tensile shear	ASTM D 1002	2,200 psi
Color		Dark gray
Pot life (75°F)		60 min
Cure time (75°F)		16 hr

Storage: Store in a cool, dry place.

6. MANUFACTURER'S GUIDANCE FOR APPLICATION

Surface preparation: Surface to be repaired must be clean and dry to ensure proper adhesion. To maximize adhesion, roughen the surface.

Mixing: Add hardener to resin. Mix thoroughly with a screwdriver or similar tool about 4 min or until a uniform consistency is obtained. Be sure to stir material from bottom and sides of container. For mixing less than full contents, use 4 parts resin to 1 part hardener by volume, or 9 parts resin to 1 part hardener by weight.

Applying: Spread epoxy over prepared application surface with a putty knife or similar tool. Working time is 60 min at 75°F.

Cure: A 1/2-in.-thick section of Devcon Epoxy Putty will harden at 75°F in 4 hr. The material will fully cure in 16 hr, at which time the material can be machined, drilled or painted. The actual cure time is determined by the size of the mass of epoxy and the temperature. The table below shows working time and cure time for a 1/2-in.-thick section of Devcon Wear Resistant Putty WR-2.

Table

Temperature	Work Time	Cure Time
60°F	90 min	32 hr
75°F	60 min	16 hr
90°F	25 min	8 hr

Hints for working with epoxy: Devcon epoxies are two-component materials that cure, or harden, by chemical reaction between the resin and hardener when they are combined. This chemical reaction generates heat; therefore, it is important to keep the following principles in mind when mixing epoxies:

a. The larger the mass of epoxy, the faster the cure.

b. The higher the temperature, the faster the cure.

c. For proper performance, epoxy must be mixed thoroughly in specified ratios.

d. Typical working time for one pound of epoxy at 75°F is 45 min. Functional cure is achieved overnight (16 hr).

e. To speed up cure of epoxy, the material should be mixed, applied to the repair area, and warmed with a heat lamp or other heat source. The heat lamp should be placed about 18 in. from the epoxy. Never expose epoxy to a direct flame.

To prevent the epoxy from sticking to a surface, coat the surface with Devcon Release Agent or other coating material such as silicone or wax.

To obtain a smooth surface, cover the uncured epoxy with a sheet of polyethylene or waxed paper. Remove the sheet when epoxy is fully cured. The surface can also be smoothed by drawing a trowel moistened with water across the surface of the uncured material. Moisten the trowel with each stroke.

Safe handling information: Devcon Putty Hardener 0200 contains triethylene and etramine, polyamines, and polyamide resin. It causes severe eye and skin burns. Wash thoroughly after handling. Do not get in eyes. Wear protective eye goggles when using these materials. Do not get on skin or clothing. In case of skin contact, immediately wipe off contamination and flush skin with plenty of water.

Follow immediately with a thorough soap and water wash. Remove and wash contaminated clothing before reuse.

In case of eye contact, immediately flush eyes with plenty of water for 15 min and get medical attention.

Use WR-2 only with adequate ventilation. Do not take internally. Keep out of reach of children.

Non-Warranty: Because the storage, handling, and application of this material is beyond the manufacturer's control, he can accept no liability for the results obtained.

7. CORPS OF ENGINEERS' EVALUATION

Mixture design data: WES used Devcon as a repair material for cavitation resistance testing as received and as a mortar with 1 part epoxy to 1 part laboratory sand.

Mixture Design
as received (lb kit)

Material	Amount
Resin	408 g
Hardener	45 g
	453 g

Mixture Design
Mortar 1:1 by volume

Material	Amount	
	Volume	Weight, g (Approximate)
Resin	52 cu in.	1,225
Hardener	13 cu in.	181
Sand	65 cu in.	2,860

Technical data:

A Venturi-type cavitation facility at WES was used to evaluate cavitation resistance. This facility operates at a velocity of about 120 ft/sec through the Venturi and causes a moderate to moderate-severe cavitation. The surface area of the test specimen exposed to cavitation was 12.4 by 11.2 cm. Results of these tests are compared to those for conventional concrete in Figure 1.

WR-2 putty as received was tested, according to ASTM C 882, for slant shear bond strength under various surface conditions.

Surface Condition	Strength* psi (MPa)
Dry	>3,000(20.6)
Damp	1,430(9.8)
Wet	1,720(11.8)

* Average of 2 specimens

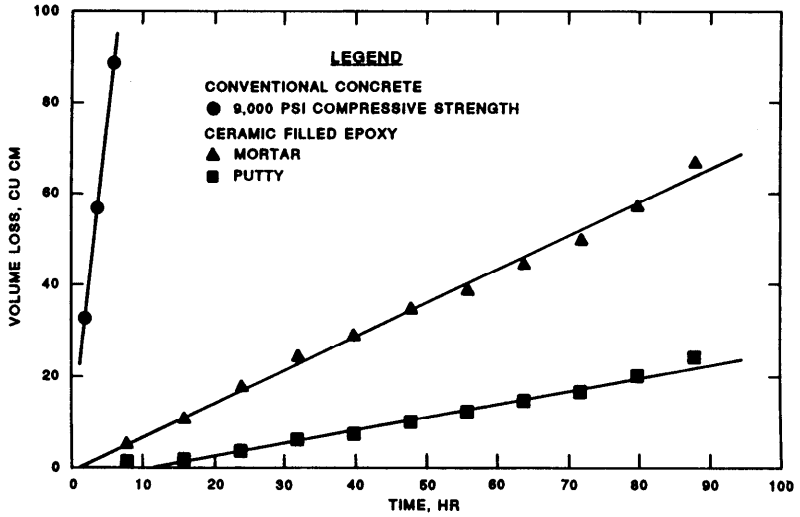

Figure 1. Cavitation tests results

8. CORPS' GUIDANCE FOR APPLICATION

Use ACI and manufacturer's recommendation for surface preparation of concrete. Manufacturer's Application Procedures and ACI are recommended for use of Devcon Wear Resistant Putty, WR-2.

9. ENVIRONMENTAL CONSIDERATIONS

Reasonable caution should guide the preparation, repair, and cleanup phases of activities involving potentially hazardous and toxic chemical substances. Manufacturer's recommendations to protect occupational health and environmental quality should be carefully followed. Material safety data sheets should be obtained from the manufacturers of such materials. In cases where the effects of a chemical substance on occupational health or environmental quality are unknown, chemical substances should be treated as potentially hazardous toxic materials.

10. AVAILABILITY AND COST

Availability: The material is available from local distributors throughout the U.S. Call the main office for the latest list.

Packaging: Kits of the following unit sizes are available: 1 lb, 3 lb, and 20 lb. Small quantity is ten 1-lb units.

Cost: FOB $11 per lb in ten 1-lb kits. Price per pound is reduced in larger kits and quantities.